



**Modeling and Simulation:  
*A Critical Component of  
DoD Science & Technology***

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**Deputy Under Secretary of Defense (Science & Technology)**

***June 2, 1999***

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# DoD Science & Technology Mission

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**To ensure that the warfighters today and tomorrow have superior and affordable technology to support their missions, and to give them revolutionary war-winning capabilities**

# Revolutionary Capabilities

*Stealth*



*Adaptive  
Optics and  
Lasers*



*Night Vision*



DoD S&T

*GPS*



*Phased Array Radar*





# Role of DUSD (S&T)

**International  
Collaborations**

**Oversight/Assessment of  
DoD S&T Investment**

**Acquisition  
Software**

**DoD Modeling  
and Simulation**

**Office of Technology  
Transfer**

**High Performance  
Computing Program**

**Laboratory  
Management/Security**



# Changing Environments



## Security Threats

Rogue Nation  
States/Alliances

International Crime  
Organizations

Transnational Actors/  
Terrorists

Weapons of  
Mass Destruction

## 21st Century

- Conflict Increasing
- Proliferation of Military and Commercial Technologies
- Operations in Urban Environments
- Preponderance of Coalitions
- Ethnic Strife

## Impact

Greater Range of  
Solutions

No US Monopoly in  
all Technologies

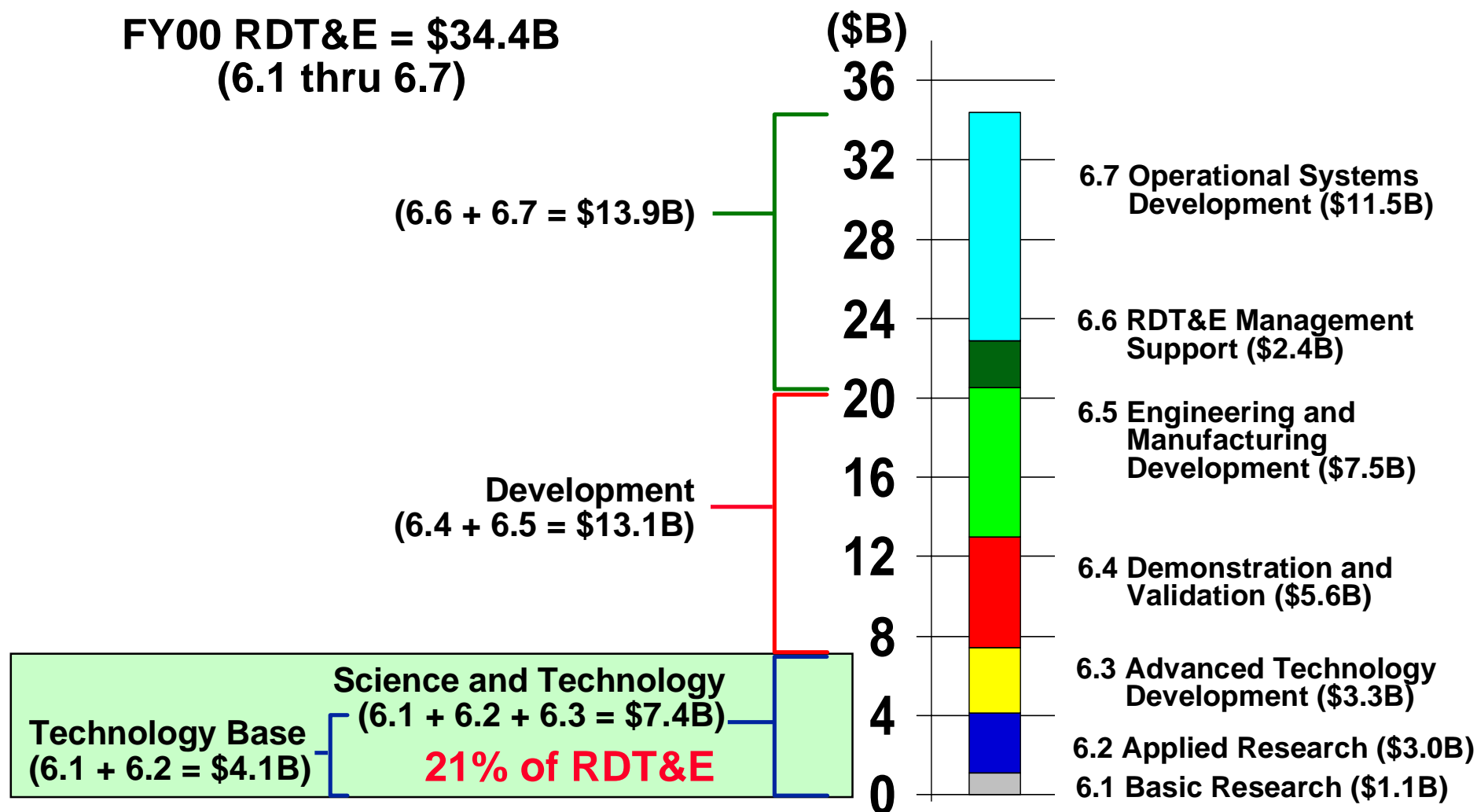
Complex Targets/Terrain

Information  
Management Critical

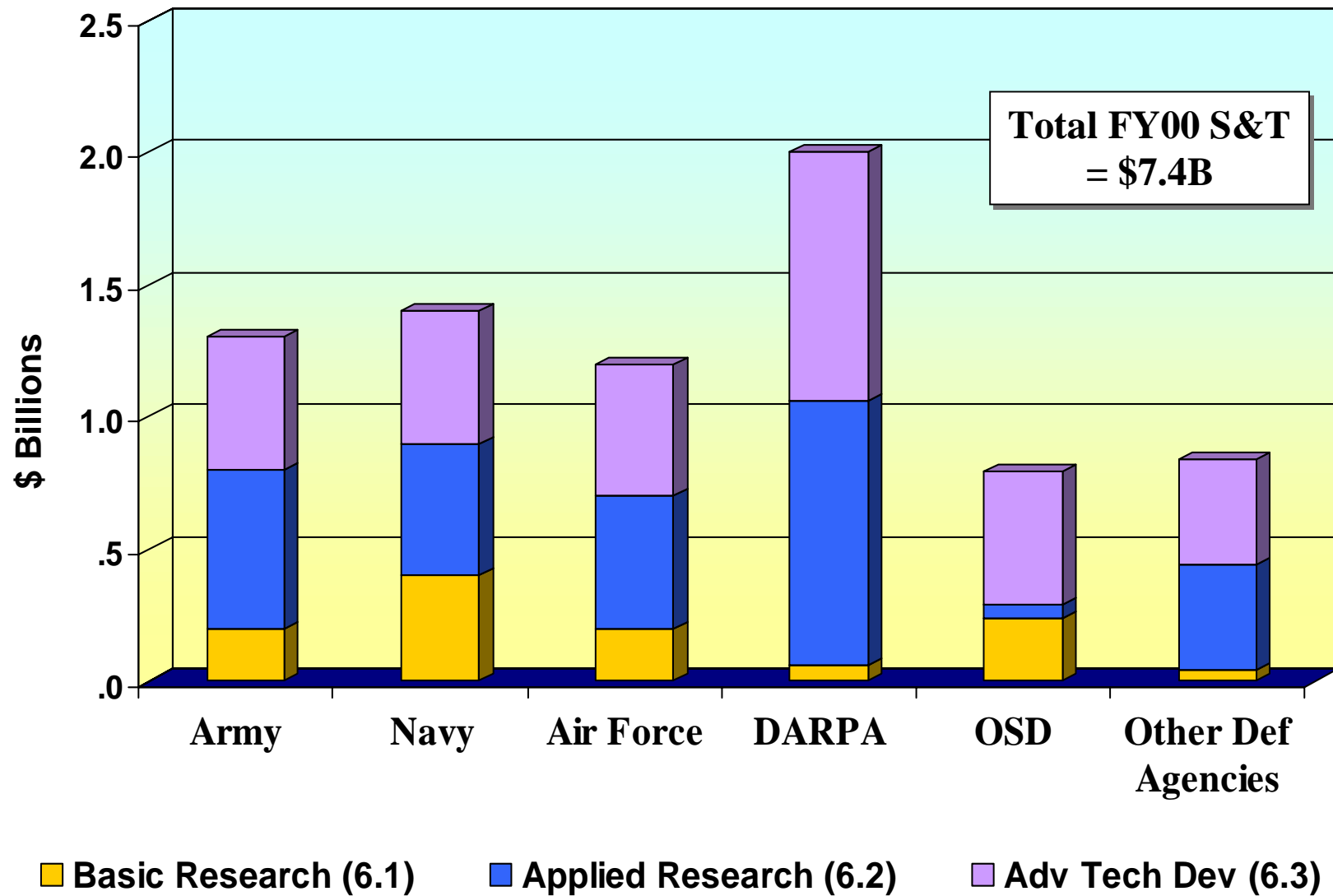
# FY2000 Research, Development, Test & Engineering (RDT&E) Funding



**FY00 RDT&E = \$34.4B**  
(6.1 thru 6.7)

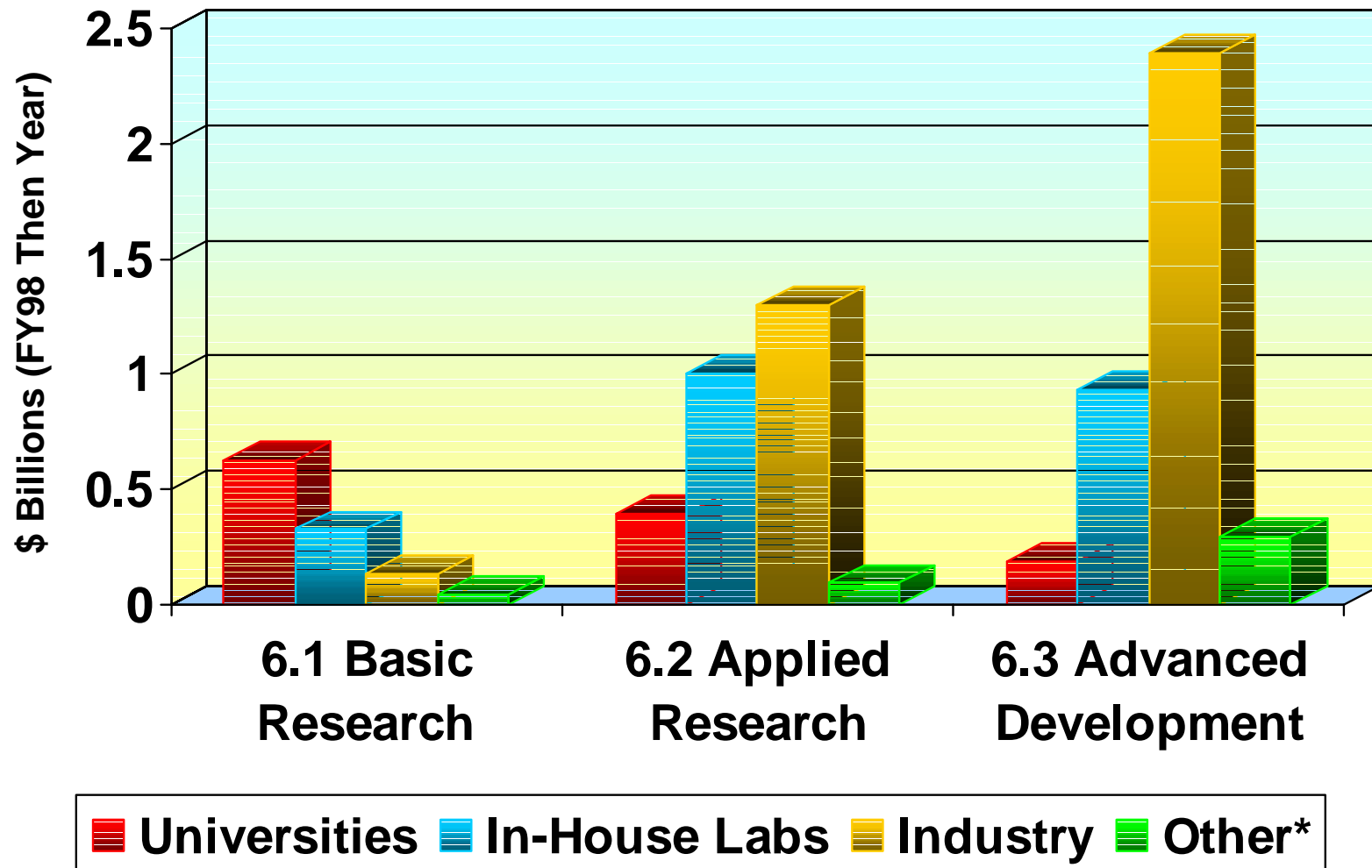


# DoD S&T Investment





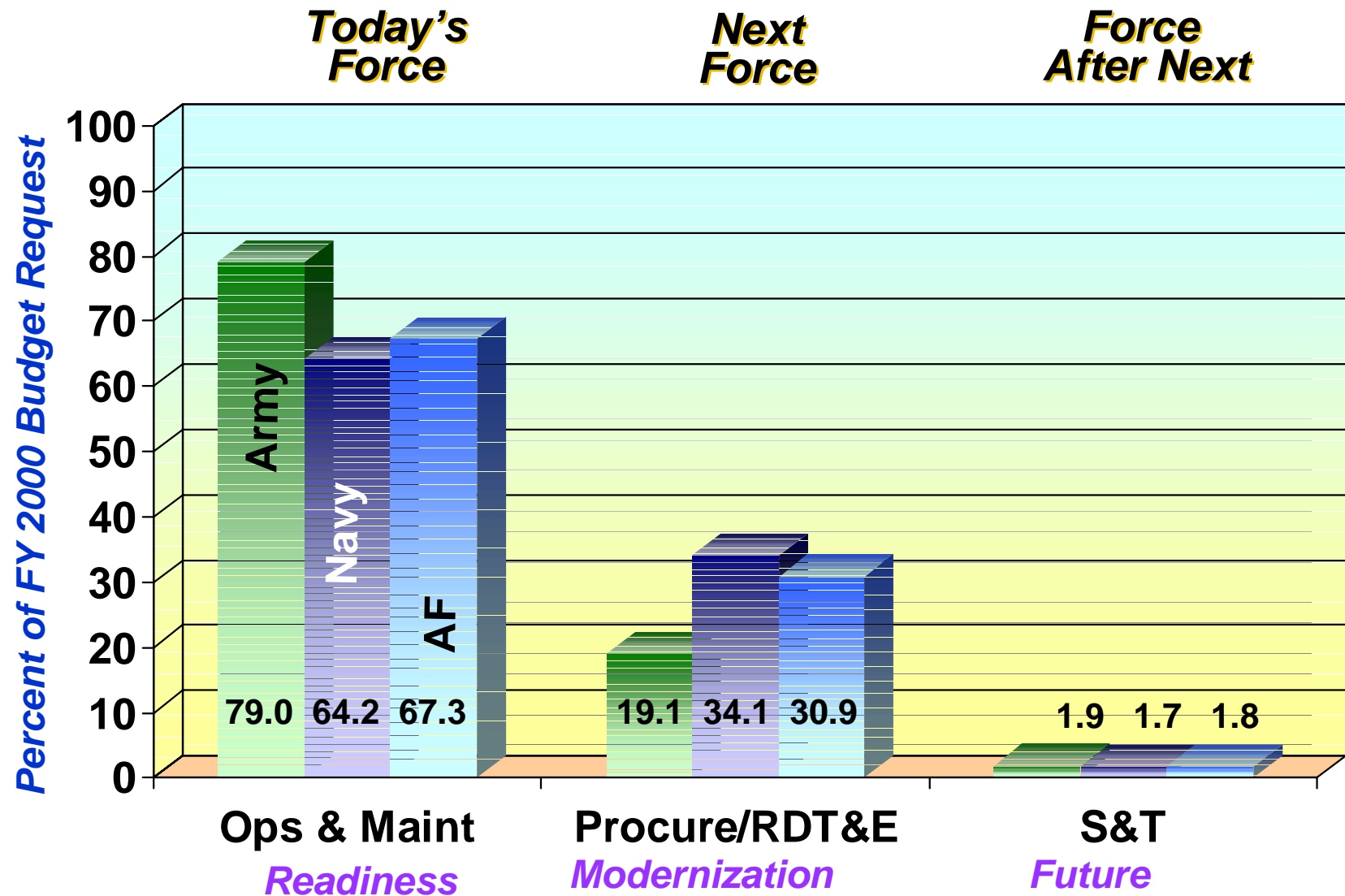
# Recipients of DoD S&T Funds



\*Includes non-profit institutions, State & local govt., & foreign institutions

Source: National Science Foundation Report, NSF 98-332 (FY 1998)

# DoD Investment Strategy



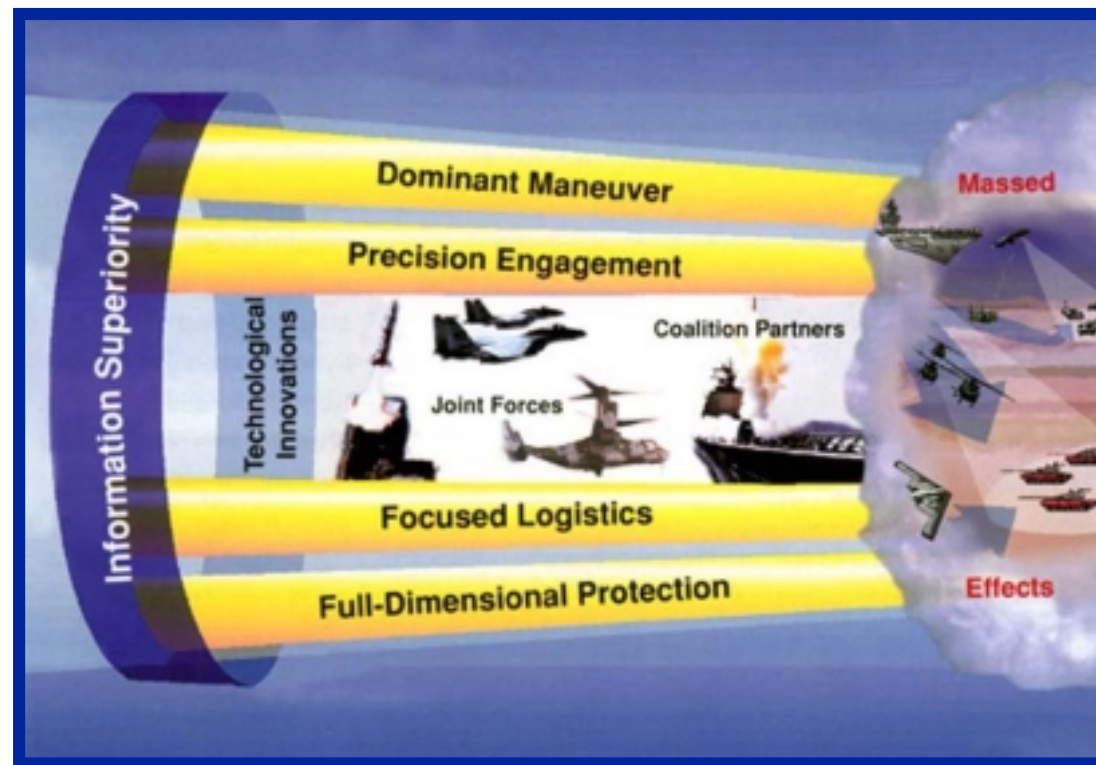
Note: AF does not include NRO & Special Ops

FY 2000 Dollars

# Joint Vision 2010



## Relies on Advancing Technology and Operational Warfighting Concepts

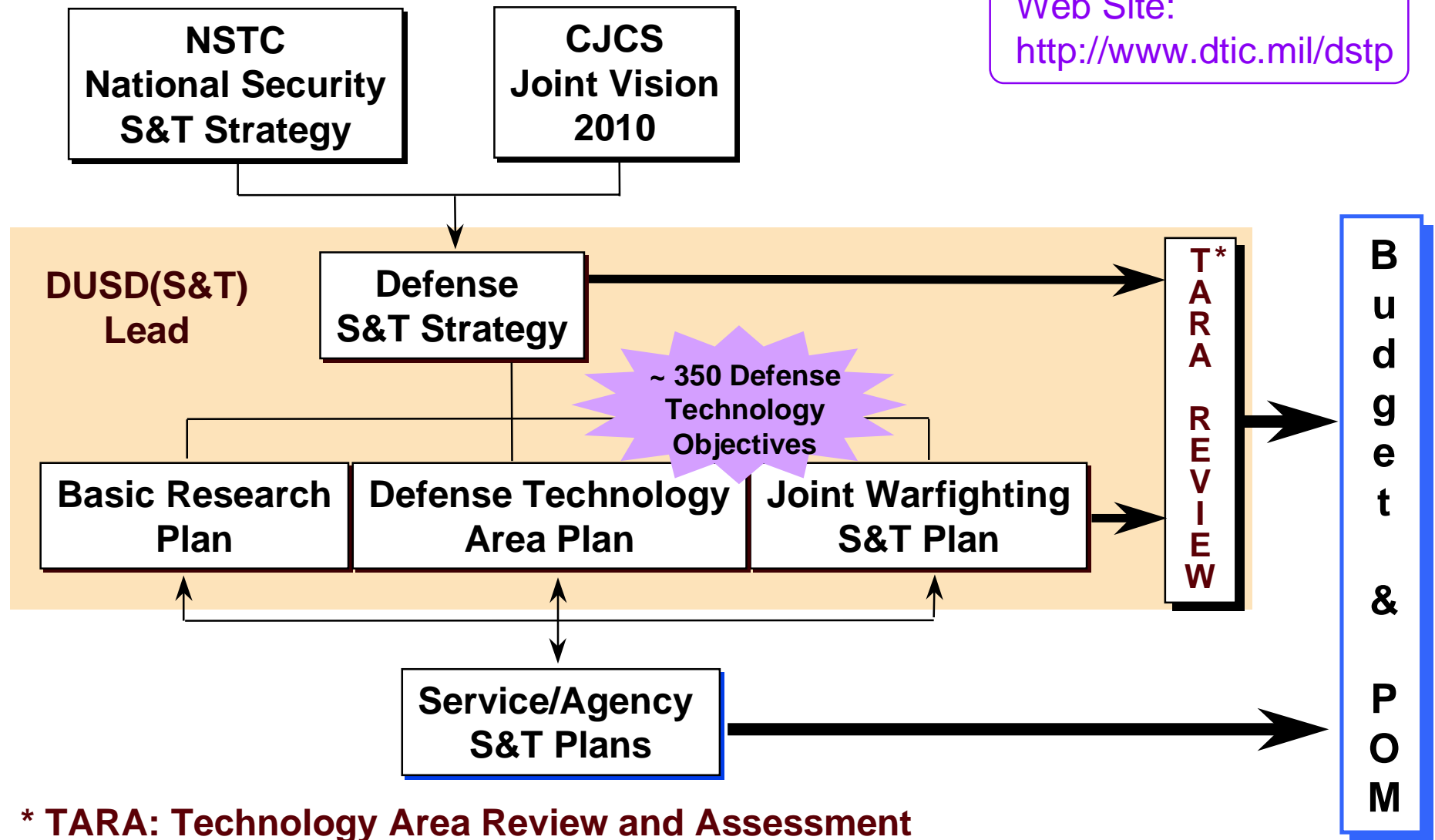


**The Lenses of Technological Innovation and Information Superiority Integrate and Amplify Four New Operational Concepts**

# Integrated Annual Defense S&T Planning Process



Web Site:  
<http://www.dtic.mil/dstp>



\* TARA: Technology Area Review and Assessment

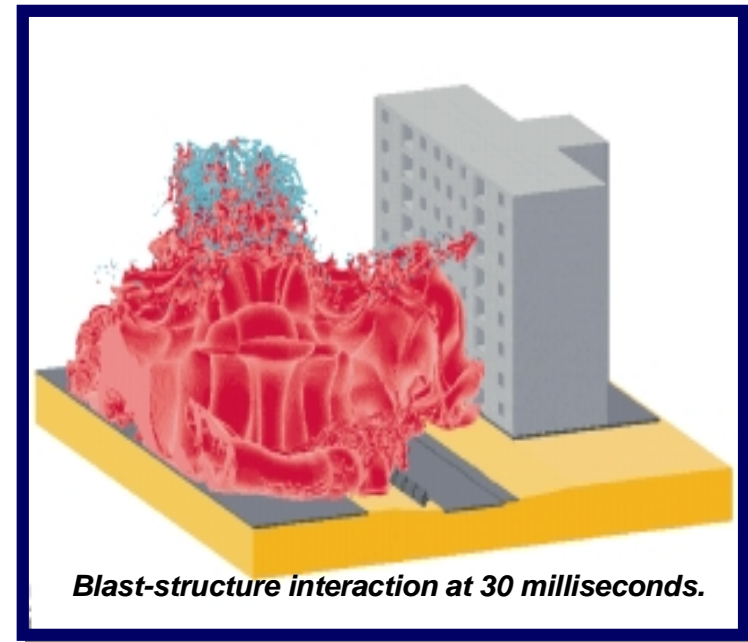
# Joint Warfighting S&T Plan (JWSTP)



- JWSTP--Focus to blend emerging technology into warfighter needs



Damaged Barracks in Saudi Arabia



Simulation of a terrorist explosion against a multistory building

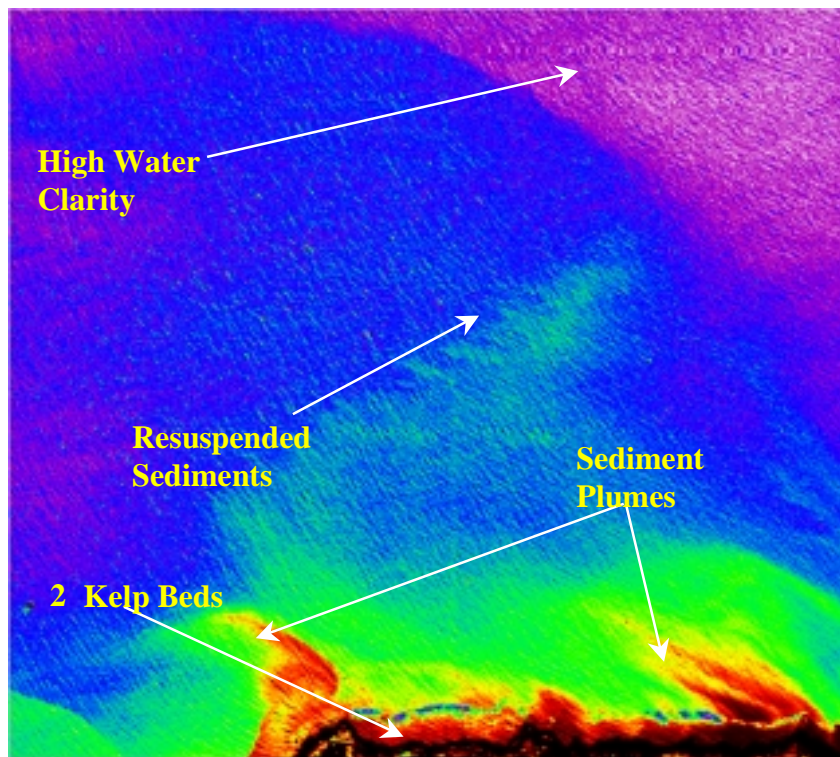
**Example:** *DTO L.06 Structural Blast Mitigation*

**Objective:** Develop techniques to mitigate shock and blast damage in structures.

# Defense Technology Area Plan (DTAP)



- DTAP--A detailed plan focusing DoD science on militarily significant technologies in specific functional areas



*An agreement  
between  
the S&T  
Community  
and Acquisition  
Customers*

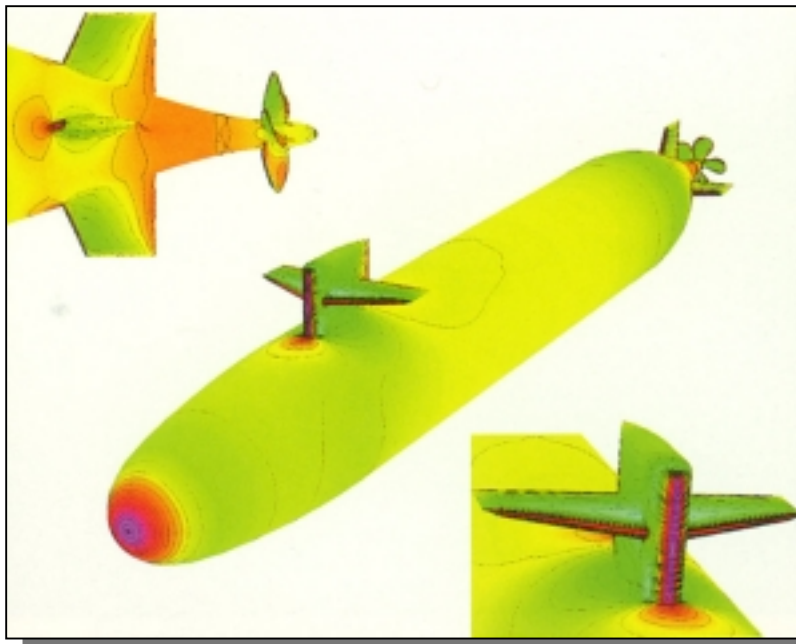
**Example: DTO SE.67 Hyperspectral Technologies**





# Basic Research Plan (BRP)

**BRP--A strategic plan to link longer term research to broad, revolutionary warfighter capabilities**



*Computer-generated, color-coded pressure distributions around fully appended submarines.*

*A Strategic plan guiding new scientific research.*

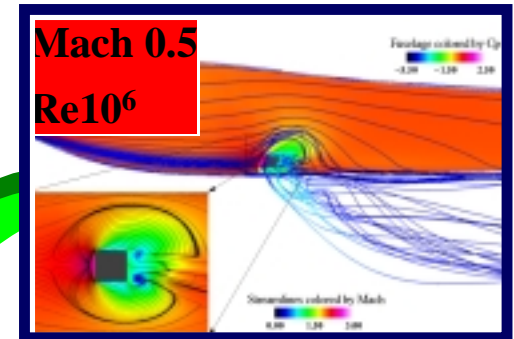
**Improved submarine designs without costly model construction**

# Defense Technology Plan (DTAP)

## M&S Technology Focus



**IS.40 Individual Combat  
& Small unit Ops Simulation**



**IS.11 Simulation  
Information Technologies**

**IS.12 Simulation  
Representation**



**M&S Applications  
(Analysis, Acquisition,  
& Training)**

**IS.10 Simulation  
Interconnection**







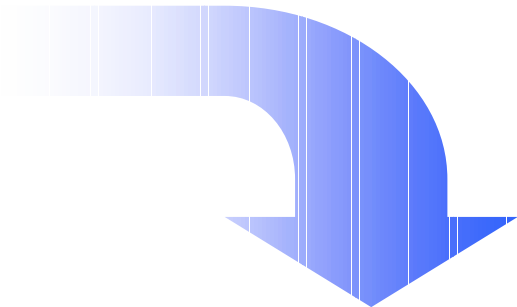
# S&T Emphasis Areas

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- Chemical & Biological Defense
- Hardened and Deeply Buried Targets
  - Smart Sensor Web
  - Cognitive Readiness
- Information Assurance

## *S&T Integration*

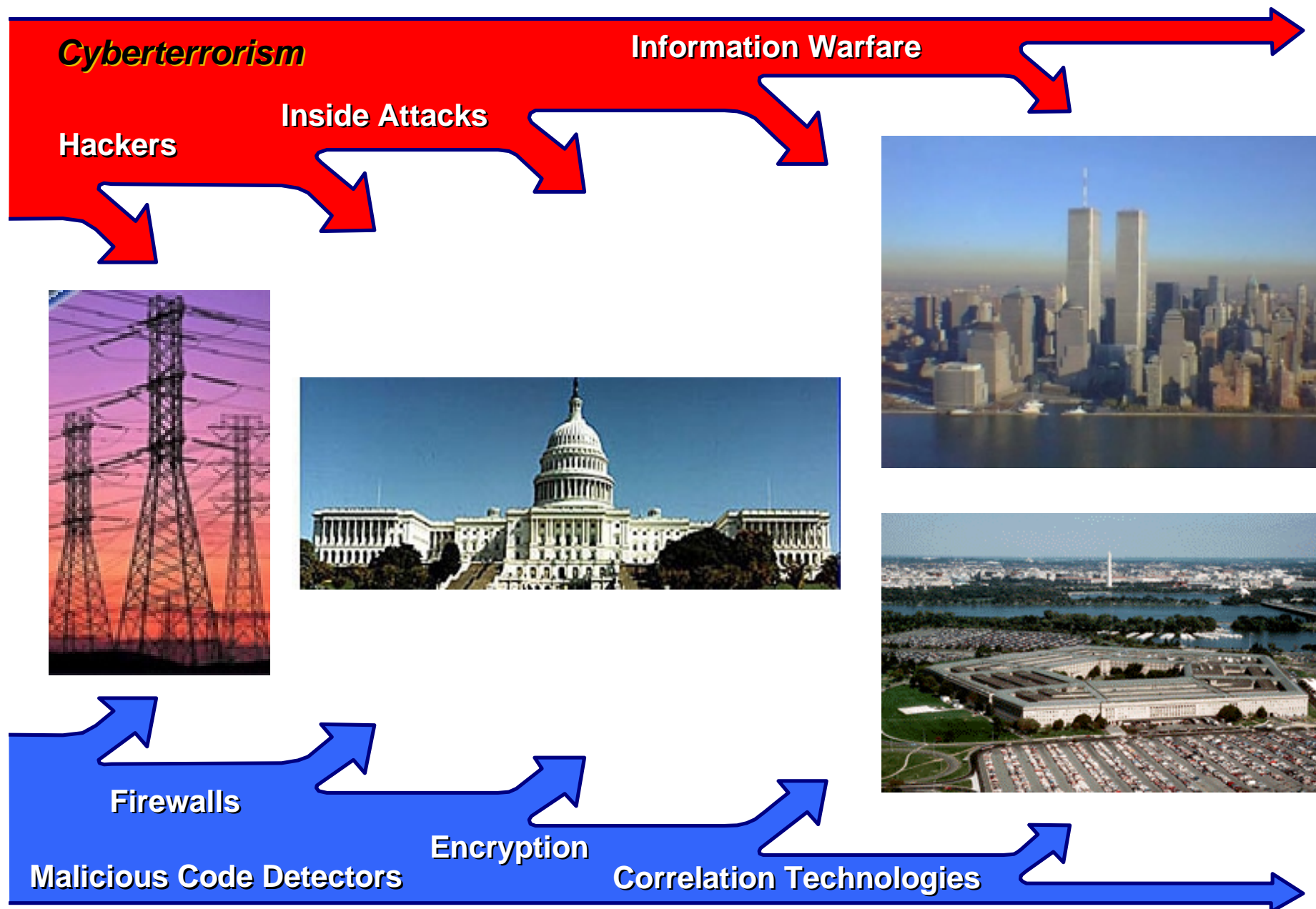
- HPCMP
- DMSO



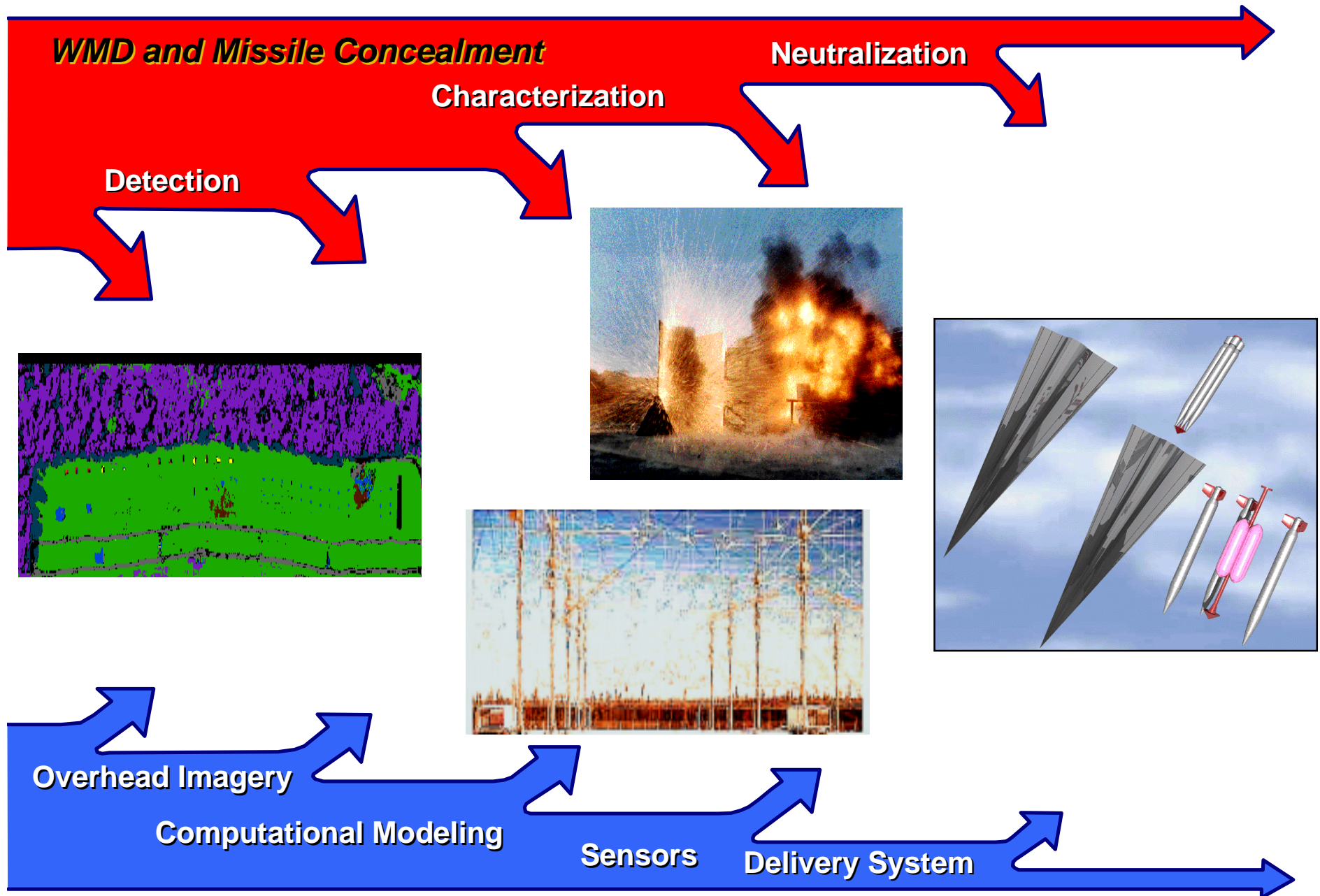
# Chemical & Biological Defense



# Information Assurance

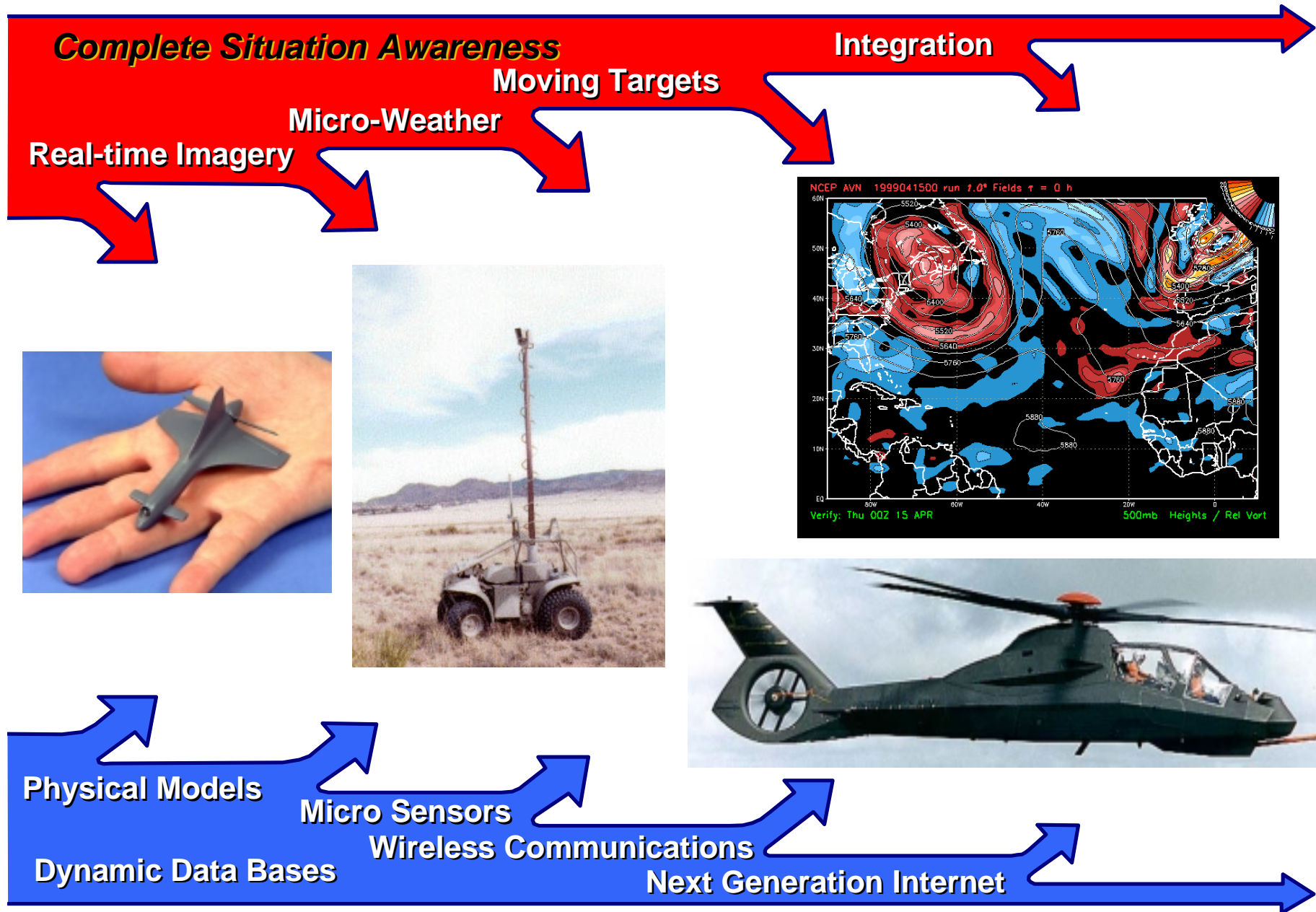


# Hardened and Deeply Buried Targets

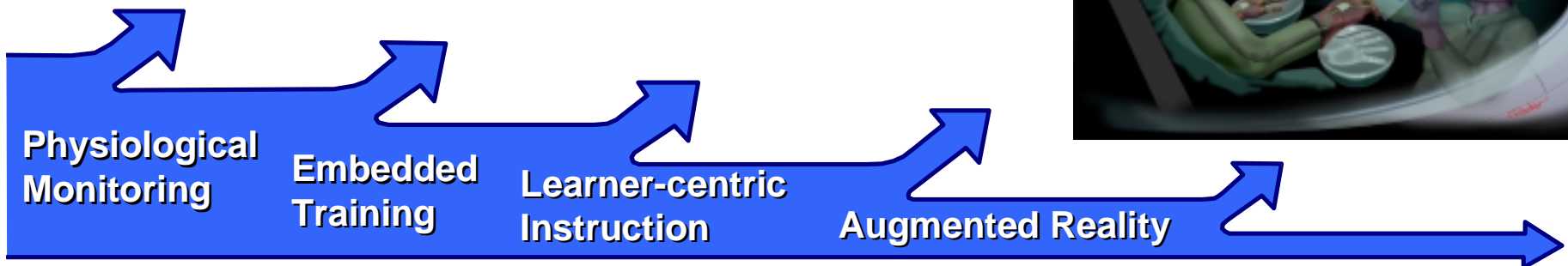
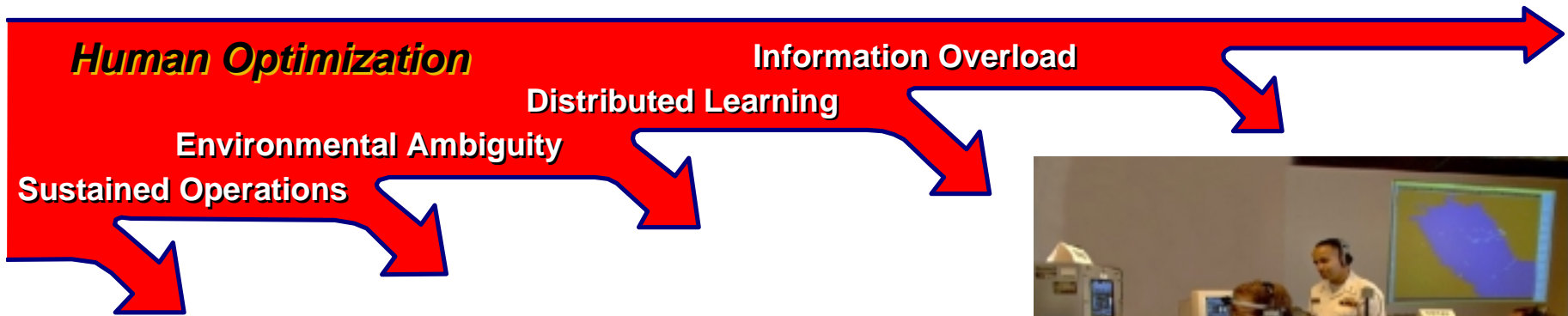




# Smart Sensor Web



# Cognitive Readiness



# High Performance Computing Modernization Program

**Mission:** Provide world-class HPC capability to the DoD science and technology and developmental test and evaluation communities

## HPCMP Resource Centers

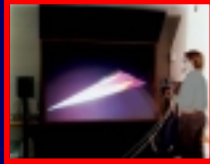
### Major Shared Resource Centers

- Networked very large computer centers
- Top 30 facilities in speed and storage



### Distributed Centers

- Complements MSRCs
- Supports local missions (real-time processing)



## CHSSI

### Common HPC Software Support Initiative

- Provides multi-purpose codes that perform on a range of HPC platforms,
- Develops critical DoD software that can execute in a scalable computing environment

## PET

### Programming Environment and Training

- Full-spectrum HPC technology transfer program
- Partners: Top academic institutions (NCSA, SDSC, 20+ academic institutions)

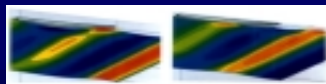


## DoD Challenge Projects

DoD Challenge Projects: competitively selected as pathfinding applications addressing mission-critical requirements.

- 28 Challenge Projects selected for FY99

16 continuing projects  
12 new projects



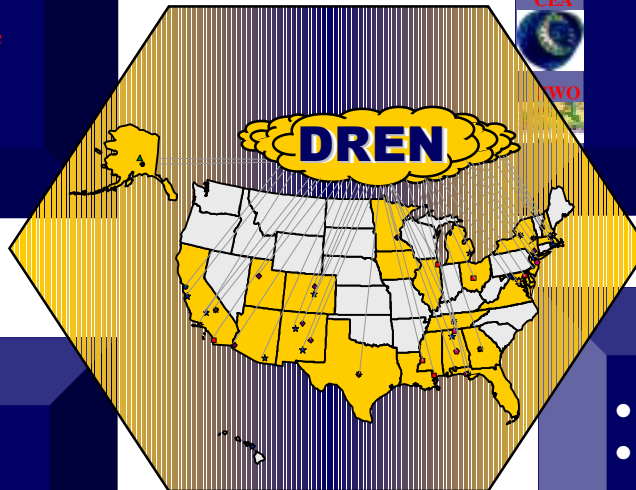
- Provides high-performance, high-bandwidth DS3 through OC3 (OC12 in the future) WAN services.
- Uses a commercial service contract.
- Provides services tailored to the requirements of a site anywhere in the 50 states.

## Requirements Analysis

- Questionnaire:
- Interviews: Service Validation: Ensures that only approved and funded projects are included
- Requirements Analysis Database:

## Resource Allocation

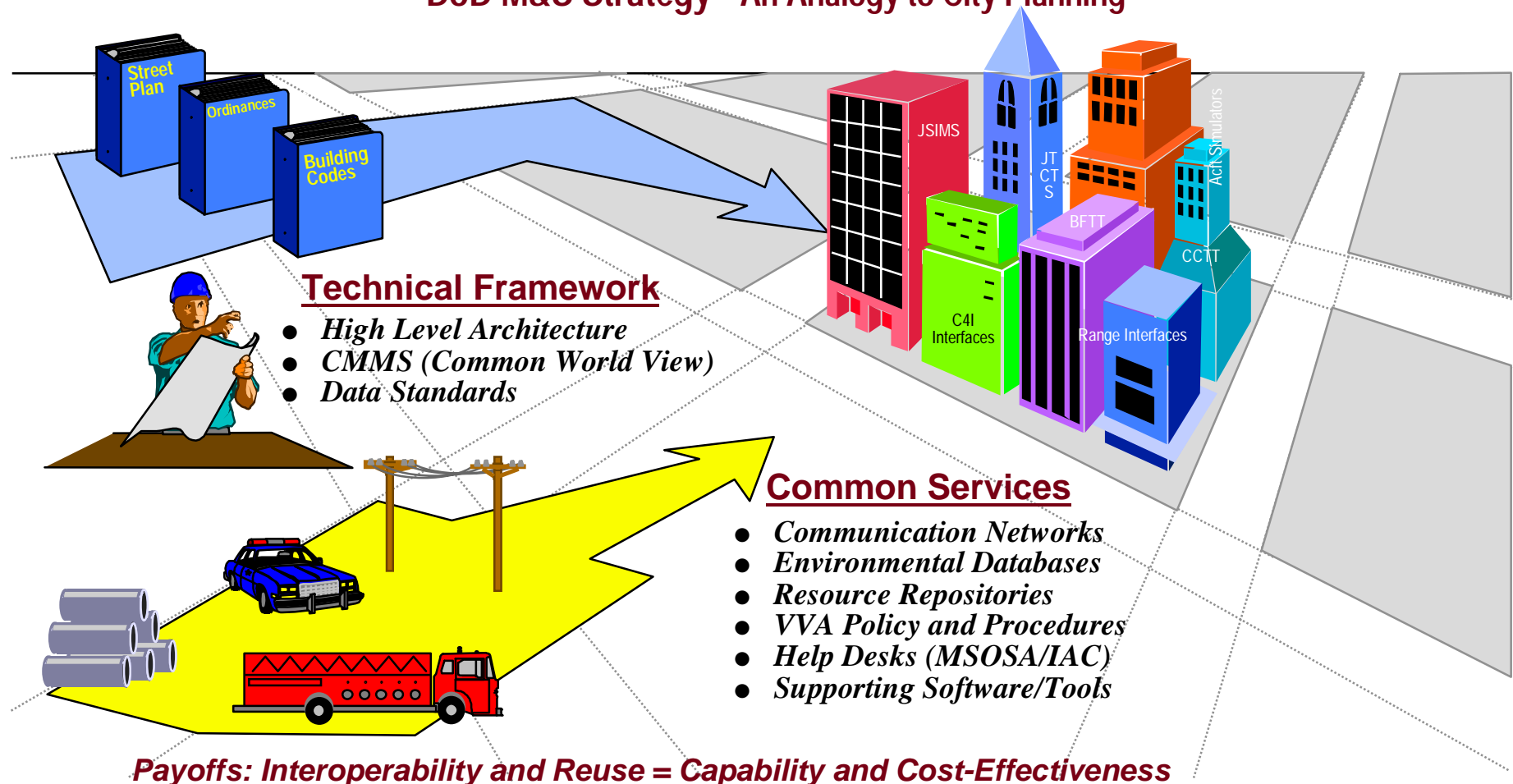
- Goal:
- Approximately 80% allocated by individual Services and Agencies
- Approximately 20% allocated to DoD Challenge Projects





# Defense Modeling and Simulation

## DoD M&S Strategy—An Analogy to City Planning





# High Level Support

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**“... simulation and modeling can help us ... by reducing the risk ... saving time ... and by making efficient use of scarce and increasingly expensive resources.” \***

**Dr. Jacques S. Gansler**  
**Under Secretary of Defense**  
**for Acquisition and Technology**

\* Remarks at the May 19, 1998, Precision Strike Association Annual Program Review, Ft Belvoir, Virginia

# Corporate Functions of DMSO

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- **M&S Standards Development**
- **M&S Education & Training**
- **Interaction with Joint M&S Programs**
- **Leadership of New M&S Initiatives**
- **Strategic Thrusts with M&S Community**

# DoD S&T is a Partnership

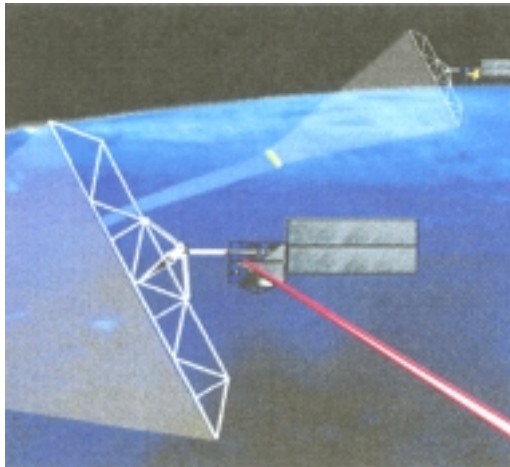


**Stable, Long Term Investment**



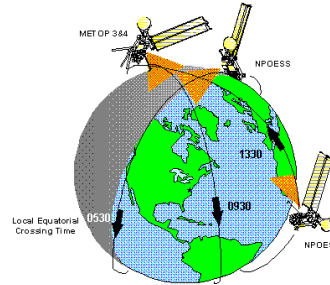
*Service Labs*

**DARPA**



**High Risk, High Payoff**

**Expanded Resource Base**



*Interagency*

**New Ideas, Knowledge**



*Universities*

**Industries**



**Innovation, Transition**

**Maximum National  
Security Payoff**

*International*



**Coalition Capability**